

CLAIMS:

1. An illumination optical system for illuminating an illuminated surface using light from a light source, said illumination optical system comprising:

a splitting optical system for splitting the light from the light source into light incident upon a first diffraction optical element, and light incident upon a second diffraction optical element;

a first polarization unit for adjusting a polarization state of the light from the first diffraction optical element;

a second polarization unit for adjusting a polarization state of the light from the second diffraction optical element; and

an integrating optical system for integrating the light from the first diffraction optical element with the light from the second diffraction optical element, and for introducing integrated light into the illuminated surface.

2. An illumination optical system according to claim 1, further comprising an adjusting unit for adjusting a light intensity of the light from the first diffraction optical element, and/or an adjusting unit

for adjusting a light intensity of the light from the second diffraction optical element.

3. An illumination optical system according to
5 claim 2, further comprising a shielding unit arranged in an optical path of the light incident upon the first and/or second diffraction optical elements.

4. An illumination optical system according to
10 claim 2, further comprising a detector for detecting a light intensity of the light from the first diffraction optical element and a light intensity of the light from the second diffraction optical element,

wherein said adjusting unit adjusts a ratio
15 between a light intensity of the light from the first diffraction optical element and a light intensity of the light from the second diffraction optical element.

5. An illumination optical system according to
20 claim 1, further comprising an integrator for forming a plurality of secondary light sources using the light from the light source,

wherein said integrating optical system
integrates the light from the first diffraction optical
25 element with the light from the second diffraction optical element at an incident surface of the integrator.

6. An illumination optical system according to claim 1, wherein said integrating optical system comprises a zooming optical system.

5 7. An illumination optical system according to claim 1, wherein said first or second polarization unit comprises a rotational $\lambda / 2$ plate.

8. An illumination optical system according to claim 1, wherein the first or second diffraction optical element is rotational.

9. An illumination optical system for illuminating an illuminated surface using light from a light source, said illumination optical system comprising:

 a first diffraction optical element upon which the light from the light source is incident; and
 a second diffraction optical element upon which the light from the light source is incident,
20 wherein the light from said first diffraction optical element forms a first part of an illumination distribution on a predetermined surface that substantially has a Fourier transform relationship with
25 the illuminated surface, and the light from the second diffraction optical element forms a second part of the illumination distribution.

10. An illumination optical system according to claim 9, further comprising third and fourth diffraction optical elements upon which the light from the light source is incident,

5 wherein the light from the third diffraction optical element forms a third part of the illumination distribution, and the light from the fourth diffraction optical element forms a fourth part of the illumination distribution.

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11. An illumination optical system according to claim 9, wherein the light that illuminates the first part and the light that illuminates the second part are linearly polarized lights that are orthogonal to each other.

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12. An illumination optical system for illuminating an illuminated surface using light from a plurality of light sources that includes first and second light sources, said illumination optical system comprising:

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 a first diffraction optical element upon which the light is incident from the first light source among the plurality of light sources;

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 a second diffraction optical element upon which the light is incident from the second light source among the plurality of light sources;

a first polarization unit for adjusting a polarization state of the light from said first diffraction optical element;

a second polarization unit for adjusting a polarization state of the light from said second diffraction optical element; and

an integrating optical system for integrating the light from the first diffraction optical system with the light from the second diffraction optical system, and for introducing integrated light into the illuminated surface.

13. An illumination optical system for illuminating an illuminated surface using light from a light source, said illumination optical system comprising:

first and second optical systems each including a diffraction optical element and a polarization unit; and

an integrating optical system for integrating the light from the first optical system with the light from the second optical system, and for introducing integrated light into the illuminated surface.

14. An exposure apparatus comprising:

an illumination optical system according to any one of claims 1, 9, 12, and 13 for illuminating a reticle; and

a projection optical system for projecting a
5 pattern on the reticle onto a plate.

15. An exposure apparatus according to claim 14, further comprising:

a detector for detecting a light intensity of
10 the light from the first diffraction optical element and a light intensity of the light from the second diffraction optical element; and

an adjusting unit for adjusting a ratio between the light intensity of the light from the first
15 diffraction optical system and the light intensity of the light from the second diffraction optical element.

16. An exposure apparatus according to claim 15, wherein the illumination optical system includes a
20 monitoring section for monitoring a light intensity at a position corresponding to a surface of the reticle, and calibrates monitoring according to an adjustment of balance.

25 17. An exposure apparatus according to claim 15, wherein the detector detects the light intensity at a

position corresponding to the surface of the reticle or
a surface of the plate.

18. A device fabrication method comprising the
5 steps of:

exposing a plate by using an exposure
apparatus according to claim 14; and
developing the plate.